REMARKS

This amendment is being filed in response to the Office Action having a mailing date of May 29, 2008. Various claims are amended as shown. No new matter has been added. With this amendment, claims 1-18, 20-43, 45-55, and 58-62 are pending in the application.

I. Rejections under 35 U.S.C. § 112, first paragraph

The present Office Action rejected claims 1-18, 20-43, 45-55, and 58-62 under 35 U.S.C. § 112, first paragraph for allegedly failing to meet the written description requirement. Specifically, the present Office Action asserted that the limitation "wherein each of said blocks is quantized with a same said quantization step" was not described in the specification.

Independent claims 1, 26, 51, and 58 are amended as shown to replace the above-quoted language with "wherein a same said quantization step is used for said scalar quantizer applied to each pixel within a block." Such recitations are described in paragraph [0051] of the published present application.

In view of these amendments to claims 1, 26, 51, and 58, it is kindly requested that the written description rejections be withdrawn.

II. Discussion of the claims and cited references

The present Office Action rejected claims 1, 2, 9-10, 15, 23-24, 26-27, 34-35, 40, 48-49, 51, 54-55, 58-60, and 62 under 35 U.S.C. § 103(a) as being unpatentable over Aravind (U.S. Patent No. 5,214,507) in further view of Balasubramanian (article entitled "Sequential Scalar Quantization of Vectors: An Analysis") and further in view of Maeda (U.S. Patent No. 5,341,441). Claims 3-8, 13-14, 21, 28-33, 38-39, 46, and 53 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Aravind, Balasubramanian and Maeda and further in view of Cho (U.S. Patent No. 6,463,100). Claims 11-12, 36-37, and 61 were rejected under 35 U.S.C. § 103(a) as being unpatentable Aravind, Balasubramanian and Maeda and further in view of Cho and Lee (U.S. Patent No. 5,731,836).

For the reasons set forth below, these rejections are respectfully traversed.

A. Independent claim 1

Independent claim 1 as amended herein recites, *inter alia*, "wherein a same said quantization step is used for said scalar quantizer applied to each pixel within a block." It is respectfully submitted that this limitation is not met by the cited references.

For example and as explained on pages 14-16 of the previous amendment/response filed on April 24, 2008, Maeda quantizes pixel values with individual quantization steps (*see, e.g.*, Figure 7 of Maeda, where DC components are quantized with a resolution of 6 bits, while his frequency components are quantized with resolutions 32/16/12 bits depending on the selected class). This technique of Maeda that uses individual/different quantizations is in contrast to the limitations of claim 1 that require the "same said quantization step" for the pixels in the block.

Aravind also does not meet the limitations of claim 1 that require "same said quantization step" for the scalar quantizer applied to each pixel within a block. Aravind teaches that a quantization parameter q_p is determined—however, this quantization parameter q_p is then multiplied with a base quantization step size matrix. Aravind describes the following in his column 3, lines 3-21 (emphasis ours):

> "Quantizer 120 contains memory 125 which stores a base quantizer step size matrix. The base quantizer step sizes, which are the elements of base quantizer step size matrix, are arranged such that one base step size corresponds to, and will be employed for quantizing, one of the transformed coefficients of each subblock of signal DCTERR. Thus, base quantizer step size matrix is an 8x8 matrix."

Thus from the above-quoted passage of Aravind, his quantizer is applied to DCT transformed data, and his base quantizer step size matrix contains base quantizer step sizes, which are in turn each multiplied by the quantization parameter q_p in order obtain an individualized step size for each DCT component. Accordingly, Aravind provides different

quantization step sizes for his pixels and therefore does not meet the limitations of claim 1 that require the same quantization step to be applied to pixels in the spatial domain.

Hence, claim 1 is allowable over the cited references. It is respectfully submitted that claim 1 contains other limitations that are allowable over the cited references.

For example, claim 1 as previously presented recited, *inter alia*, "repeated application in a spatial domain of a scalar quantizer to the pixels, which are in the spatial domain, of said blocks with a quantization step determined in an adaptive way according to characteristics of the pixels in the spatial domain." It is respectfully submitted that these limitations are not met by the cited references.

The present Office Action admitted on pages 4-5 that Aravind and Balasubramanian are both silent as to "quantization in the spatial domain."

To supply the missing teachings of Aravind and Balasubramanian, the present Office Action has relied upon Maeda. However, it is respectfully submitted that Maeda does not cure the deficiencies of Aravind and Balasubramanian.

The present Office Action relies upon column 12, lines 47-63 of Maeda, which is reproduced below, along with column 12, line 64 to column 13, line 4 (emphasis ours):

> "Further, image data can be subjected to multistage vector quantization directly without applying an orthogonal transform. Such an example is illustrated in FIG. 8. Here the image input unit 11 and line buffer 12 are the same as those shown in FIGS. 1. The image data divided every four lines by the line buffer 12 enter the scalar quantizer 15 directly without undergoing orthogonal transformation. The scalar quantizer 15 scalar-quantizes the image data non-linearly every block of 4x4 pixels, and converts the image data into image data in which each pixel is composed of four bits. Four sub-blocks, each of which is composed of (4 bits/pixel)x4 pixels, enter as the addresses of respective ROMs 61, 62, 63, 64 for the first stage of vector quantization. Each sub-block is outputted upon being converted into an 8-bit code by the table information stored in the ROMs 61-64.

> With regard to the second and third stages of vector quantization, ROMs 65, 66 and 67 are used, exactly as in the case of FIG. 7, and 12-bit quantized data are eventually obtained from the ROM 67. Image quality can be controlled just as in the case where orthogonal transformation was applied by selecting the codes in each stage, namely the 32 bits of the first stage, the 16 bits of the second stage or the 12 bits of the third stage, by means of the selector 80."

From the above-quoted passages of Maeda, it is abundantly clear that Maeda teaches that his scalar quantizer uses a **fixed quantization step**, which is not determined in an adaptive way. The fact that his quantizatin step is fixed can be derived from the above-quoted passages of Maeda, wherein his ROMs 61-67 have look-up tables (LUTs) that store the code bits to be used for each of the stages of the quantization. Thus, image quality can only be controlled by means of the subsequent stages/ROMs 61 to 67 by selecting the codes in each stage, namely the selector 80 selects the 32 bits of the first stage, the 16 bits of the second stage or the 12 bits of the third stage.

It is respectfully submitted that Maeda's storing and applying these preset/fixed code bits in ROM in his first, second, and third stages do not meet the limitations of claim 1 that require "repeated application in a spatial domain of a scalar quantizer to the pixels, which are in the spatial domain, of said blocks with a quantization step determined in an adaptive way." For example, since Maeda's code bits are stored/fixed in his ROMs (read-only memories that cannot have their data changed), he does not provide the "adaptive way" to determine the quantization as required in claim 1.

Hence, claim 1 is further allowable over the cited references.

Claim 1 is further amended herein to recite, *inter alia*, "wherein said quantization step determined in the adaptive way is performed in the spatial domain instead of transforming the pixels to a frequency domain." Support for this amendment can be found in paragraphs [0064] to [0066] of the present application as published. It is respectfully submitted that these limitations make claim 1 further allowable over the cited references.

For example and as explained above, Aravind uses a DCT transformation, and in contrast, the present Office Action has cited Maeda as teaching (non-adaptive) quantization in the spatial domain. It is respectfully submitted that such different teachings of Aravind and Maeda are incompatible with each other, thereby making these references non-combinable to meet the limitations of claim 1 that require "wherein said quantization step determined in the adaptive way is performed in the spatial domain instead of transforming the pixels to a frequency domain."

For the reasons set forth above, it is therefore kindly requested that the rejection of claim 1 and its dependent claims be withdrawn.

B. Other independent claims

Independent claims 26, 51, and 58 are amended in a manner generally similar to claim 1. By way of analogy with respect to the reasons set forth above, it is respectfully submitted that claims 26, 51, and 58 and their respective dependent claims are also allowable.

III. Conclusion

Overall, none of the references singly or in any motivated combination disclose, teach, or suggest what is recited in the independent claims. Thus, given the above amendments and accompanying remarks, the independent claims are now in condition for allowance. The dependent claims that depend directly or indirectly on these independent claims are likewise allowable based on at least the same reasons and based on the recitations contained in each dependent claim.

If the attorney of record (Dennis M. de Guzman) has overlooked a teaching in any of the cited references that is relevant to the allowability of the claims, the Examiner is requested to specifically point out where such teaching may be found. Further, if there are any informalities or questions that can be addressed via telephone, the Examiner is encouraged to contact Mr. de Guzman at (206) 622-4900.

The Director is authorized to charge any additional fees due by way of this Amendment, or credit any overpayment, to our Deposit Account No. 19-1090.

All of the claims remaining in the application are believed to be allowable. Favorable consideration and a Notice of Allowance are earnestly solicited.

Respectfully submitted,

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